

WHAT IS CLAIMED IS:

1 1. A receptacle for holding fine powders, the receptacle comprising:
2 a receptacle body that defines an enclosed cavity, wherein the receptacle
3 body has a top end and a bottom end, and wherein the bottom end of the receptacle body
4 includes a raised central region that extends upwardly into the cavity.

1 2. A receptacle as in claim 1, wherein the receptacle body further
2 comprises at least one curved wall that in combination with the raised central region
3 forms a generally semi-toroidal geometry in the cavity.

1 3. A receptacle as in claim 1, wherein a portion of the bottom end is
2 flat in geometry.

1 4. A receptacle as in claim 1, wherein the receptacle body further
2 includes a tab extending from the cavity

1 5. A receptacle as in claim 1, further comprising a central hole in the
2 top end and multiple vents, and a cover removably attached to the top end to cover the
3 hole and the vents.

1 6. A method for aerosolizing a powder, the method comprising:
2 providing a receptacle having a top end, a bottom end, and a cavity
3 containing a powder;
4 inserting a bottom end of an extraction tube into the cavity such that the
5 bottom end of the extraction tube is spaced above the bottom end of the receptacle;
6 forming at least one vent in the cavity;
7 forming a hole in the bottom end of the cavity; and
8 flowing a gas stream through the hole in the bottom end of the receptacle
9 and through at least a portion of the extraction tube to cause air to be drawn through the
10 vent and then through the cavity to move the powder in the cavity into the extraction tube
11 where the powder is entrained in the high pressure gas stream to form an aerosol.

1 7. A method as in claim 6, wherein the bottom end of the receptacle
2 includes a raised central region that extends upwardly into the cavity, and further
3 comprising aligning the extraction tube with the raised central region such that the bottom
4 end of the extraction tube is spaced apart from the raised central region.

1 8. A method as in claim 6, further comprising capturing the
2 aerosolized powder in a capture chamber.

1 9. A method as in claim 6, further comprising forming multiple vents
2 in the top end of the receptacle about a periphery of the cavity such that air is drawn
3 through substantially all of the cavity to remove the powder.

1 10. A method as in claim 6, further comprising forming tabs in the top
2 end of the receptacle body that extend into the cavity to create a vortex within the cavity
3 as the air flows through the cavity.

1 11. A method as in claim 6, further comprising a patient inhaling to
2 produce the gas stream.

1 12. A method as in claim 6, further comprising releasing an amount of
2 pressurized gas to produce the gas stream.

1 13. A method for aerosolizing a powdered medicament, the method
2 comprising:

3 providing a receptacle comprising a receptacle body that defines an
4 enclosed cavity, wherein the receptacle body has a top end and a bottom end, and wherein
5 the bottom end of the receptacle body includes a raised central region that extends
6 upwardly into the cavity;

7 inserting a bottom end of an extraction tube into the cavity such that the
8 bottom end of the extraction tube is aligned with the raised central region and is spaced
9 above the bottom end of the receptacle;

10 10. forming vents in the top end of the receptacle about a periphery of the
11 cavity; and

12 12. flowing a gas stream through a least a portion of the extraction tube to
13 draw air through the vents and then through the cavity to move the powder in the cavity
14 into the extraction tube where the powder is entrained in the gas stream to form an
15 aerosol.

1 14. A method as in claim 13, wherein the receptacle includes a curved
2 wall, and wherein the air flows along the wall to remove substantially all powder from the
3 receptacle.

1 15. A method as in claim 13, wherein the air drawn by the gas stream
2 flows through a flow area, and further comprising reducing the flow area as the air flows
3 through the receptacle and the extraction tube to accelerate the flow of air through the
4 receptacle.

1 16. A method as in claim 15, wherein the vents form a first flow area,
2 wherein a gap between the extraction tube and the bottom end of the receptacle defines a
3 second flow area, and wherein a cross section of the extraction tube defines a third flow
4 area, and wherein the first flow area is greater than the second flow area, and wherein the
5 second flow area is greater than the third flow area.

1 17. A method as in claim 16, wherein the ratio of the first flow area to
2 the second flow area and to the third flow area is about 2.0:1.5:1.0.

1 18. A method as in claim 13, further comprising piercing a hole
2 through the top end of the receptacle and inserting the extraction tube into the cavity
3 through the hole in the top end.

1 19. A method as in claim 13, further comprising introducing the gas
2 stream into the extraction tube at a location spaced apart from the bottom end of the
3 extraction tube.

1 20. A method as in claim 13, further comprising forming a hole in the
2 bottom end of the receptacle body, and flowing the gas stream through the hole in the
3 bottom end.

1 21. A method as in claim 13, further comprising a patient inhaling to
2 produce the gas stream.

1 22. A method as in claim 13, further comprising releasing an amount
2 of pressurized gas to produce the gas stream.

1 23. A method for aerosolizing a powdered medicament, the method
2 comprising:

3 providing a receptacle comprising a receptacle body that defines an
4 enclosed cavity, wherein the receptacle body has a top end and a bottom end;

5 inserting a bottom end of an extraction tube into the cavity such that the
6 bottom end of the extraction tube is spaced above the bottom end of the receptacle;

7 forming vents in the top end of the receptacle about a periphery of the
8 cavity; and

9 flowing a gas stream through a least a portion of the extraction tube to
10 draw air through the vents and then through the cavity to move the powder in the cavity
11 into the extraction tube where the powder is entrained in the gas stream to form an
12 aerosol; and wherein the air drawn by the gas stream flows through a flow area, and
13 further comprising reducing the flow area as the air flows through the receptacle and the
14 extraction tube to accelerate the flow of air through the receptacle.

1 24. A method as in claim 23, further comprising a patient inhaling to
2 produce the gas stream.

1 25. A method as in claim 23, further comprising releasing an amount
2 of pressurized gas to produce the gas stream.

1 26. A method as in claim 23, wherein the vents form a first flow area,
2 wherein a gap between the extraction tube and the bottom end of the receptacle defines a
3 second flow area, and wherein a cross section of the extraction tube defines a third flow
4 area, and wherein the first flow area is greater than the second flow area, and wherein the
5 second flow area is greater than the third flow area.

1 27. A method as in claim 23, wherein the receptacle further comprises
2 a curved wall, and wherein the bottom end of the receptacle body includes a raised central
3 region that extends upwardly into the cavity to provide a generally laminar air flow along
4 the wall.

1 28. An apparatus for aerosolizing a powdered medicament, the apparatus
2 comprising:

3 a housing having a holder that is adapted to receive a receptacle having a
4 cavity that holds a powder;

5 a piercing mechanism that is adapted to pierce a hole in a bottom end of
6 the receptacle;

7 a vent forming mechanism for forming multiple vents in a top end of the
8 receptacle; and

9 an extraction tube that is adapted to be placed into the cavity so as to be
10 spaced above the bottom end of the receptacle and to be aligned with the hole in the
11 bottom end.

1 29. An apparatus as in claim 28, further comprising a mouthpiece
2 coupled to the housing that is adapted to receive a patient's mouth to permit the patient to
3 produce a gas stream that is flowed through the hole in the bottom end of the receptacle
4 and into extraction tube to draw the powder from the cavity and into the extraction tube
5 where the powder is entrained in the gas stream to form an aerosol

1 30. An apparatus as in claim 28, further comprising a flow insert to
2 control spacing of the extraction tube relative to the receptacle.

1 31. A system for aerosolizing a powdered medicament, the system
2 comprising:

3 at least one receptacle that comprises a receptacle body that defines an
4 enclosed cavity, wherein the receptacle body has a top end and a bottom end, and wherein
5 the bottom end of the receptacle body includes a raised central region that extends
6 upwardly into the cavity; and

7 an aerosolizing apparatus having a holder for holding the receptacle, an
8 extraction tube that is insertable into the cavity, a vent forming device to form multiple
9 vents in the top end of the receptacle about a periphery of the cavity.

1 32. A system as in claim 32, further comprising a pressure source for
2 producing a high pressure gas stream within at least a portion of the extraction tube to
3 draw air through the vents to move the powder from the cavity and into the extraction
4 tube where the powder is entrained in the high pressure gas stream to form an aerosol.

1 33. A system as in claim 32, further comprising a flow insert to control
2 spacing of the extraction tube relative to the receptacle.

1 34. A system as in claim 32, wherein a portion of the bottom end of the
2 receptacle is flat in geometry.

1 35. A powder extraction system, comprising:
2 at least one receptacle that defines an enclosed cavity that holds a powder,
3 wherein the receptacle has a top end and a bottom end;
4 a holder to hold the receptacle;
5 an extraction tube that is insertable into the cavity;
6 a vent forming device to form vents in the top end of the receptacle,
7 wherein the vents form a first flow area, wherein a gap between the extraction tube and
8 the bottom end of the receptacle defines a second flow area, and wherein a cross section
9 of the extraction tube defines a third flow area, and wherein the holder is configured to
10 move the receptacle relative to the bottom end of the extraction tube such that the first
11 flow area is greater than the second flow area, and wherein the second flow area is greater
12 than the third flow area to accelerate a gas flowing through the receptacle.

1 36. A system as in claim 36, further comprising a pressure source for
2 producing a high pressure gas stream within at least a portion of the extraction tube to
3 draw air through the vents to move the powder from the cavity and into the extraction
4 tube where the powder is entrained in the high pressure gas stream to form an aerosol

1 37. A system as in claim 36, wherein the receptacle includes a curved
2 wall, and wherein the bottom end of the receptacle includes a raised central region that
3 extends upwardly into the cavity.